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(71)Applicant : UNITIKA LTD

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(72)Inventor : KAMAMOTO KENTARO

HIBINO TOSHIHIDE

OKAMOTO YOSHIHISA

(54) PRODUCTION OF POLYESTER WOVEN OR KNITTED FABRIC

(57)Abstract:

PURPOSE: To provide a woven and/or knitted fabric of good touch as well as deep coloration

CONSTITUTION: Side-by-side type latently shrinkable conjugated fibers composed of a low shrinking polyester component and a high shrinking polyester component are prepared. The conjugated fibers show over 50 % shrinkage after treatment with boiling water for 30 minutes. The yarns of these fibers are woven or knitted. The woven or knitted fabric is heat-treated to allow the conjugated fibers to develop shrinkage, then dyed. The preferred low shrinking polyester component is prepared by effecting the copolymerization so that the total mole number of the ethylene glycol and terephthalic acid becomes more than 95 mole %. Meanwhile, the preferred high shrinking polyester component is obtained by copolymerizing ethylene and terephthalic acid with 5 to 15 mole % of 2,2- bis[4-(2-hydroxy-ethoxy)phenyl] propane and isophthalic acid in total.

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CLAIMS

[Claim(s)]

[Claim 1] Consist of a low shrinkage nature polyester component and a high shrinkage-- characteristics polyester component, and percentage of crimp after priming 30-minute processing obtains woven knitted goods using a line of thread which comprised a side by side type potential crimp nature bicomponent fiber which is not less than 50%, and heat-treats to these woven knitted goods, A manufacturing method of polyester system woven knitted goods which this side by side type potential crimp nature bicomponent fiber is made to reveal crimp, and are characterized by dyeing and finishing to these woven knitted goods.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention has color with especially depth about the manufacturing method of the woven knitted goods which consist of polyester fiber, and it relates to the manufacturing method of the good woven knitted goods of a hand.

[0002]

[Description of the Prior Art]The woven knitted goods by which knitting and weaving were carried out using polyester fiber have the outstanding physical characteristic and chemical property.

It is widely used for the object for garments, industrial use, etc.

However, compared with the woven knitted goods by which knitting and weaving were carried out using semi-synthetic fibers, such as woven knitted goods by which knitting and weaving were carried out using natural fibers, such as wool yarn and silk, or rayon, and acetate, it has the fault of being inferior to the depth of color (especially black), or the clear nature of color. Compared with a natural fiber or a semi-synthetic fiber, since it is smooth and uniform, incident light cannot be easily refracted by the surface state of polyester fiber due to the inside of woven knitted goods, and this is considered to be because for there to be much irregular reflection light to the exterior.

[0003]For this reason, as the surface of polyester fiber is made unevenness and incident light is easily refracted inside woven knitted goods, irregular reflection light to the exterior is lessened, and to raise the depth of color and the clear nature of color is tried. For example, the method of covering the surface of woven knitted goods, i.e., the surface of polyester fiber, with the substance of low refractive indices, such as oxidized silicon particles, is proposed (JP,2-35069,B). Woven knitted goods are immersed in the alkaline aqueous solution containing a specific compound, the surface of polyester fiber is hydrolyzed, and the method of rough-*(ing) a fiber surface is also proposed (JP,2-35068,B). However, in order that the former method might give the substance of a low refractive index to the polyester fiber surface, there was a fault of causing the fall of the hand of woven knitted goods. When wash was repeated, the substance of the low refractive index was omitted from the fiber surface, and there was a fault that color faded. Since the latter method was what carries out dissolution removal of the surface of polyester fiber, there was a fault that textiles intensity fell and the mechanical strength (for example, tensile strength) of woven knitted goods fell. The process of giving the substance of a low refractive index, and the alkali-weight-loss-treatment process were needed, the production process of the knit fabric became complicated, and these methods were not able to be said to be a rational method.

[0004]

[Problem(s) to be Solved by the Invention]Then, when a certain specific side by side type potential crimp nature bicomponent fiber is used for this invention as polyester fiber to be used, If woven knitted goods are produced by the conventional general method, without needing a special process, the woven knitted goods which have the color which is deep only by it, and have a good hand will be obtained.

[0005]

[Means for Solving the Problem] Namely, this invention consists of a low shrinkage nature polyester component and a high shrinkage-characteristics polyester component, Percentage of crimp after priming 30-minute processing obtains woven knitted goods using a line of thread which comprised a side by side type potential crimp nature bicomponent fiber which is not less than 50%, and heat-treats to these woven knitted goods. This side by side type potential crimp nature bicomponent fiber is made to reveal crimp, and it is related with a manufacturing method of polyester system woven knitted goods dyeing and finishing to these woven knitted goods.

[0006] In this invention, a side by side type potential crimp nature bicomponent fiber which consists of a low shrinkage nature polyester component and a high shrinkage-characteristics polyester component first is prepared. And by heat-treating, a differential shrinkage arises in both polyester components, and this side by side type potential crimp nature bicomponent fiber reveals crimp. It is made for percentage of crimp after priming 30-minute processing of a grade of a manifestation of this crimp to be not less than 50% in this invention. Here, percentage of crimp after priming 30-minute processing is measured by a method shown below. That is, a side by side type potential crimp nature bicomponent fiber which could be lent 5 times and carried out in a sizing reel is doubled, 1/6000 (g/D) of loads are applied, and it hangs to a stand, and is neglected for 30 minutes, and it puts in priming, maintaining this state subsequently, and processes for 30 minutes. Then, air-drying and load of 1/500 (g/D) are applied for 30 minutes, and length (a) is measured. Next, after removing 1/500 (g/D) of loads, the length (b) is measured, applying load of 1/20 (g/D). And it asks for percentage of crimp by the following formula. That is, it is percentage-of-crimp (%) = $[(b-a) / b] \times 100$. Since it becomes difficult to acquire color which is hard to reveal crimp of detailed spiral shape, therefore is hard to produce detailed unevenness on the bicomponent fiber surface, and is deep even if it heat-treats to a bicomponent fiber that this percentage of crimp is less than 50%, it is not desirable.

[0007] A side by side type potential crimp nature bicomponent fiber used by this invention comprises a low shrinkage nature polyester component and a high shrinkage-characteristics polyester component as it was described above. Anythings can be used for them if two sorts of these polyester components have a difference in shrinkage characteristics. Generally, a polymer of ethylene glycol and terephthalic acid is used as a low shrinkage nature polyester component. It is preferred to use polyester which polymerized so that the number of sum total mols of ethylene glycol and terephthalic acid might become more than 95 mol % especially to the total number of mols of a monomer which constitutes polyester polymers and which consists of a poly ERECHIN terephthalate independent substantially. The limiting viscosity $[\eta]$ of such a low shrinkage nature polyester component is generally 0.55 or less. Limiting viscosity $[\eta]$ said here is measured in the 20 ** same weight mixed solvent of phenol and tetrachloroethane.

[0008] It is preferred to use ethylene glycol and terephthalic acid and to use polyester which carried out copolymerization generally, as a high shrinkage-characteristics polyester component, using other dicarboxylic acid components and diol components. For example, 2-2-bis[4-(2-hydroxyethoxy) phenyl] propane is used as other diol components, using isophthalic acid as other dicarboxylic acid components. It is preferred that both number of sum total mols uses polyester produced by carrying out copolymerization with ethylene glycol and terephthalic acid in the 5-15-mol% of range to the total number of mols of a monomer which constitutes polyester polymers. Even if only other dicarboxylic acid components use only isophthalic acid, for example and use polyester which carried out copolymerization with ethylene glycol and terephthalic acid as a high shrinkage-characteristics polyester component, without using other diol components, Compared with the low shrinkage nature polyester component, shrinkage characteristics do not become not much high, but a tendency which does not reveal good crimp arises. Only other diol components use only 2-2-bis[4-(2-hydroxyethoxy) phenyl] propane, for example, without using other dicarboxylic acid components, A tendency for color fastness to light to fall produces a bicomponent fiber which uses polyester which carried out copolymerization with ethylene glycol and terephthalic acid as a high shrinkage-characteristics polyester component. Probably because this high shrinkage-characteristics polyester component has the loose fine structure, color which is high and is deep according to a synergistic effect with a manifestation of crimp is

acquired. [of dyeing affinity]

[0009] A line of thread is obtained using a side by side type potential crimp nature bicomponent fiber explained above. As this line of thread, a multifilament line of thread to which two or more monofilaments which consist of a side by side type potential crimp nature bicomponent fiber come to converge, a spinning line of thread to which it comes to carry out the spinning of the staple fiber in which it consists of a side by side type potential crimp nature bicomponent fiber, etc. can be used. This line of thread is used for either one of warp or the woof, or is used for both warp and the woof, and weaving of the textiles is carried out. As a textile construction, publicly known arbitrary textile constructions are conventionally employable. Or ** editing of the knitting is carried out using this line of thread. A knitted tissue can also adopt conventionally publicly known arbitrary knitted tissues, such as interlock and mock RODI. When obtaining such woven knitted goods and using a multifilament line of thread as a line of thread, a non-twisted line of thread may also be owner *****. However, it is preferred to use owner ***** and it is preferred to apply especially ** of 1000 or more T/M to give deep color to woven knitted goods.

[0010] Heat treatment and dyeing-and-finishing processing are performed to such woven knitted goods. Heat treatment and dyeing-and-finishing processing may be performed by a separated process, and may be simultaneously performed at one process. It is rational to perform heat treatment and dyeing-and-finishing processing at one process simultaneously especially. As a method of giving simultaneously, when dyeing, temperature of not less than 80 ** of wet heat should just adopt ***** conditions given to woven knitted goods 30 minutes or more. If dyeing finish is performed on this condition, detailed crimp will be revealed to a side by side type potential crimp nature bicomponent fiber, and a bicomponent fiber is dyed. When performing dyeing finish on this condition, it is preferred to use a jet dyeing machine etc. so that load of the high tension may not be carried out to woven knitted goods. If load of the high tension is carried out at the time of this dyeing finish, a tendency for a crimp manifestation of a side by side type potential crimp nature bicomponent fiber to be checked, or for once revealed crimp to disappear will arise.

[0011] Although polyester system woven knitted goods are obtained as mentioned above, in order to raise a hand of woven knitted goods further, alkali weight loss treatment may be performed. Alkali weight loss treatment is generally performed, before performing heat treatment and dyeing-and-finishing processing to woven knitted goods. Publicly known arbitrary methods can be conventionally used for a method of alkali weight loss treatment. After performing heat treatment and dyeing-and-finishing processing to woven knitted goods, in order to raise depth of color further, dark stain processing may be performed. As a dark stain processing agent, it is preferred to use polyurethane system resin, fluororesin, etc.

[0012]

[Example]

Copolymerization of example 1 8 mol of ethylene glycol %, 2-2-screw [4-(2-hydroxyethoxy) phenyl] propane 5 mol % and a total of 87-mol% of ethylene glycol, and the terephthalic acid was carried out, and the high shrinkage-characteristics polyester component was obtained. On the other hand, copolymerization of ethylene glycol and terephthalic acid beyond sum total 95 mol % was carried out, and the low shrinkage nature polyester component of limiting viscosity [eta] 0.53 was obtained. These two ingredients were used and the side by side type undrawn yarn was conventionally obtained by the publicly known compound spinning method. This undrawn yarn was extended, it was considered as the side by side type potential crimp nature bicomponent fiber, this was converged, and the multifilament line of thread of 50 deniers / 12 filament was obtained. The percentage of crimp after priming 30-minute processing of this side by side type potential crimp nature bicomponent fiber was 69.5%.

[0013] The above mentioned multifilament line of thread was used for warp and the woof, it passed through it, and weaving of the taffeta of 110 densities/inch and 80 latitude density/inch was carried out. Using the solution which used together 1 g/l of caustic alkali of sodium, and 1 g/l of surface-active agents for this taffeta, with the circular jet dyeing machine by Hisaka Works, Ltd., relaxed scouring was performed on condition of for [80 ** of wet heat, and time] 20 minutes, and it dried. Subsequently, presetting was performed on the conditions for 180 ** of

dry heat, and time 20 seconds, without passing and ** applying tension in the tenter by city metal working incorporated company.

[0014] Then, the disperse dye liquid of the following presentation was used, and it dyed and finished on condition of for [130 ** of wet heat, and time] 30 minutes using the circular jet dyeing machine by Hisaka Works, Ltd.

account Dianix Black RB-UP (disperse dye by Mitsubishi Kasei Corp.) 15%o.w.f. Dianix Black F (disperse dye by Mitsubishi Kasei Corp.) 3.0%o.w.f. SANSORUTO RZ-8 (level dyeing agent by Japanese flower chemicals incorporated company). 0.5-g/l acetic acid (48%) It dried, after using screw Norian P-70(1 bath reduction cleaning agent by shrine oil and fat industry incorporated company on the other hand) 5 g/l and performing reduction cleaning after that [0.2 cc/l] on the wet heat of 80 **, and the conditions for time 20 minutes. Then, it dried, after having used the FAMI ton supermarket 30 (Japanese flower chemicals incorporated company make, fluorine system dark stain), adjusting the solution with a temperature of 60 ** by PH7 and performing moist heat treatment on condition of for [7.0%o.w.f., bath ratio 1:20, and time] 30 minutes. Subsequently, using the tenter by city metal working incorporated company, the finish set was performed on the conditions for 170 ** of dry heat, and time 20 seconds, and black solid color textiles were obtained. The depth of the color of the textiles produced by making it above was evaluated. The L* value measured by the MAKUBE scalar eye estimated this evaluation. An L* value expresses the visual density of a color.

It is shown that color has depth as what has a small L* value.

As a result, the L* value of textiles before carrying out dark stain processing using the FAMI ton supermarket 30 is 15.1.

The L* value of textiles after carrying out dark stain processing was 13.0.

[0015] The side by side type potential crimp nature bicomponent fiber was obtained like the example except carrying out copolymerization of 12 mol of ethylene glycol %, and a total of 88-mol% of ethylene glycol, and the terephthalic acid, and using polyester as a comparative example quantity shrinkage-characteristics polyester component. The percentage of crimp after priming 30-minute processing of this bicomponent fiber is 45.0%.

It is inferior to crimp nature.

And this side by side type potential crimp nature bicomponent fiber was used, and black solid color textiles were obtained like the example. As a result, the L* value of textiles before carrying out dark stain processing using the FAMI ton supermarket 30 is 16.9.

The L* value of textiles after carrying out dark stain processing was 15.7.

[0016]

[Function and Effect(s) of the Invention] The manufacturing method of the polyester system woven knitted goods concerning this invention consists of a low shrinkage nature polyester component and a high shrinkage-characteristics polyester component, and after carrying out the volume on weaving using the line of thread which comprised a side by side type potential crimp nature bicomponent fiber with predetermined percentage of crimp, it performs crimp manifestation and dyeing. Therefore, when many detailed unevenness arises on the surface of a bicomponent fiber and a bicomponent fiber is dyed by this crimp manifestation, the scattered reflection of incident light is controlled and the effect that depth appears in that color is done so. Since many detailed unevenness arises on the surface of a bicomponent fiber, a textiles gap produces, a swelling appears in a line of thread, and the exceptional prominent effect that a hand becomes good also does so.

[Translation done.]